IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	Confirm. No.: 6028
NISHIDA	Atty. Ref.: 900-407
Serial No. 09/986,987	TC/A.U.: 1763
Filed: November 13, 2001	Examiner: Olsen, A.

For: ASHING METHOD

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August 1, 2006

MAIL STOP AF
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request. This request is being filed with a notice of appeal. The review is requested for the reason(s) stated on the attached sheet(s).

REASON(S) FOR REVIEW

SUBJECT MATTER OF THE APPEAL

The claims on appeal concern a semiconductor process known as ashing. In the method of Applicant's independent claims (i.e., claims 1, 13, and 19), the ashing is performed relative to a resist mask, and involves holding a substrate (4) having the resist mask formed on a low dielectric constant insulating film in a chamber of an ashing apparatus (the chamber and apparatus are shown in Fig. 1). An RF electric power is applied (as shown at 2 in Fig. 1) to activate an almost pure oxygen gas introduced in the chamber in order to perform ashing of the resist mask, while an RF electric power is applied (as shown by 6 in Fig. 1) to the substrate, thereby obtaining formation of a protective film on a surface of the low dielectric constant insulating film. Applicant's method further requires that a ratio (Ws/Wb) of the RF electric power (Ws) for activating the almost pure oxygen gas to the RF electric power (Wb) applied to the substrate be set so that the change rate of the dielectric constant of the low dielectric constant insulating film before and after ashing is 10 % or less. The independent claims also specify that the ratio (Ws/Wb) is controlled to be 5 or less.

Thus, all independent claims require that (1) a ratio (Ws/Wb) be set so that the change rate of the dielectric constant of the low dielectric constant insulating film before and after ashing is 10 % or less; and (2) the ratio (Ws/Wb) is controlled to be 5 or less.

The claimed subject matter, including the claimed ratio, advantageously suppresses an increase in dielectric constant of the low dielectric constant insulating film which otherwise would be caused by ashing (see page 13, line 16 to page 14, line 4 of the specification).

REASON(S) FOR REVIEW

"CHANGE RATE OF THE DIELECTRIC CONSTANT" IS DEFINITE

On page 2, the final office action objects to the phrase "change rate of the dielectric constant" as employed in claims 1, 13, 16 – 19, alleging that the specification "addressed the change in the dielectric constant and not the rate at which the dielectric constant changes".

The phrase "change rate of the dielectric constant" has been used throughout the course of this six-action prosecution, and by its context both in the specification and the claims is understood to refer to the degree of change of the dielectric constant of the low dielectric constant insulating film before and after ashing, such change being required to be 10 % or less.

The Merriam-Webster Online Dictionary defines the noun "rate" as:

> **3 a :** a fixed ratio between two things **b :** a charge, payment, or price fixed according to a ratio, scale, or standard: as (1) **:** a charge per unit of a public-service commodity (2) **:** a charge per unit of freight or passenger service (3) **:** a unit charge or ratio used in assessing property taxes (4) *British* **:** a local tax
> **4 a :** a quantity, amount, or degree of something measured per unit of something else <her typing *rate* was 80 words per minute> **b :** an amount of payment or charge based on another amount; *specifically* **:** the amount of premium per unit of insurance.

Note particularly definition 3a: *a fixed ratio between two things*

If the claim objection is a veiled rejection, then the finality of the office action should be withdrawn in order to give Applicants an opportunity to consider same and, if desired, amend the claim without incurring risk of a new issues rejection.

REASON(S) FOR REVIEW

KROPEWNICKI DOES NOT ANTICIPATE OR MAKE OBVIOUS

Kropewnicki fails to disclose a ratio Ws/Wb set so that the change of the dielectric constant before *and* after ashing is 10 % or less. Thus, the claimed subject matter is not anticipated by Kropewnicki.

In the above regard, page 7, lines 61-66 of Kropewnicki describe "low dielectric constant, such as a dielectric constant less than about 3.2, and more preferably, less than about 3.0". In view of this description, the office action alleges "the dielectric constant of a material with the preferred dielectric constant of 3.0 cannot change by $\geq$ 10 % because this would result in a dielectric constant that exceeds Kropewnicki's upper limit of 3.2" (see page 4, last paragraph of the Office Action).

A correct interpretation of col. 7, lines 53 – col. 8, lines 54 of Kropewnicki, is that it describes the preferred *starting* dielectric constant values of the Kropewnicki low dielectric 45. What Kropewnicki describes is a preferred initial value of 3.2 and a more preferred initial value of 3.0. The differential between a preferred initial value of 3.0 and a more preferred initial value 3.2 is inconsequential. Nowhere does Kropewnicki specify or suggest what the final dielectric constant should be, and therefore there is no basis to conclude what degree of dielectric change is or is not acceptable to Kropewnicki.

Thus, Kropewnicki only indicates a preferred initial dielectric constant of a dielectric material, and therefore does *not* indicate the *change* of the dielectric constant before and after ashing as the Examiner alleges. Kropewnicki has no motivation to achieve the claimed subject matter since he has no suggestion on the change in dielectric constant before and after ashing.

REASON(S) FOR REVIEW

Applicant's independent claims also specify that the ashing gas is "almost pure oxygen gas", whereas Kropewnicki has an additive gas necessarily comprising NH_3. Therefore, Kropewnicki is *different* in gas type. There are various ramifications of Kropewnicki's use of NH_3 which show that Kropewnicki is inimical to Applicant's independent claims. For example, the ashing gas of Kropewnicki is the additive gas, and therefore, it is more costly than Applicant's. Also, there is a possibility that, during ashing, NH_3 might be reacted with a carbon atom comprised in a resist, and then highly toxic CN compounds might be formed. By contrast, since Applicant's ashing gas is almost pure oxygen gas, there is no possibility that the CN compounds might be formed.

As another major distinction, Kropewnicki fails to disclose suppressing the change in the film quality of low-k film. In Applicant's claims, a protective film comprising SiO suppresses the decrease of the dielectric constant of the low-k film (see page 10, lines 17-22).

Applicant's suppression differs from any method such as using NH_3 in an ashing gas to replenish -CH3 in a low dielectric constant insulating film during ashing (and thereby possibly suppress decrease of the dielectric constant of the low-k film).

Accordingly, it is respectfully requested that the final rejection be withdrawn.

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